1978

PLANNING FOR THE 1980S

IMPACTS OF TECHNOLOGY ON INFORMATION PROCESSING

INPUT

INPUT LIBRARY

INPUT

CONTENTS

1. INTRODUCTION

2. EDP ENVIRONMENT

3. IBM FUTURE
   - LARGE SYSTEM DEVELOPMENTS

4. DISTRIBUTED DATA PROCESSING (DDP)

5. SOFTWARE ISSUES
   - DATA BASE MANAGEMENT

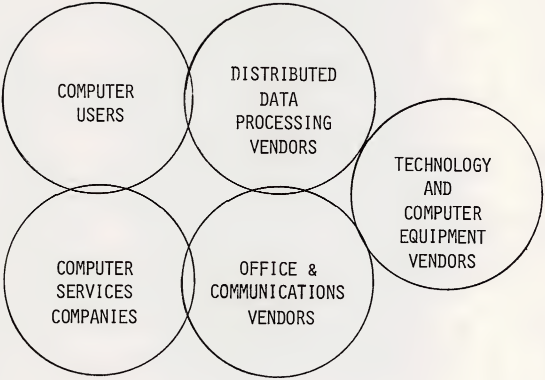
6. COMPUTER SERVICES GROWTH AND PROFITABILITY

7. MULTI-FUNCTION EQUIPMENT

8. DISTRIBUTION CHANNELS

1. INTRODUCTION

INPUT RESEARCH CLIENTS



COMPUTER USERS

DISTRIBUTED DATA PROCESSING VENDORS

TECHNOLOGY AND COMPUTER EQUIPMENT VENDORS

COMPUTER SERVICES COMPANIES

OFFICE & COMMUNICATIONS VENDORS

OBJECTIVES AND METHODOLOGY

- ANALYZE AND FORECAST USER DEMAND
- BASED ON EXTENSIVE USER RESEARCH
  - PANEL OF 500 USERS
  - 2500 USER INTERVIEWS PER YEAR

STAFF/OFFICES

- CALIFORNIA
  - 32 EMPLOYEES
- NEW YORK
  - 10 EMPLOYEES
- LONDON
  - 5 EMPLOYEES
- MILAN
  - ASSOCIATED WITH PGP SISTEMA
- TOKYO
  - ASSOCIATED WITH OVERSEAS DATA SERVICES
- SYDNEY
  - ASSOCIATED WITH INFOCOM
- STAFF AVERAGES 20 YEARS EXPERIENCE
  - LINE MANAGERS IN INDUSTRY
  - ENGINEERING, DATA PROCESSING
  - MARKETING, OPERATIONS, FINANCE, PLANNING

MAJOR CLIENTS

EQUIPMENT

CDC
GENERAL ELECTRIC
HONEYWELL
INTEL
IBM
PITNEY BOWES
XEROX

COMMUNICATIONS

AT&T
BELL CANADA
ITT
SATELLITE BUSINESS SYSTEMS
UNITED COMMUNICATIONS
WESTERN UNION

USERS/SERVICE

BOEING
CONTINENTAL INSURANCE
FORD

SUN OIL COMPANY
UNITED AIRLINES

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AUTOMATIC DATA PROCESSING
COMPUTER SCIENCES
ITEL
TYMSHARE

GOVERNMENT/INTERNATIONAL

HONEYWELL/BULL
JIPDEC
SIEMENS
U. S. GOVERNMENT - OTP

2. EDP ENVIRONMENT

EDP ENVIRONMENT

SUMMARY

- 10 TIMES AS MANY COMPUTER USERS IN 1983 AS 1978
    - MOSTLY NOT TRAINED IN EDP
    - USE TERMINALS AND SMALL COMPUTERS
- DISTRIBUTED DATA PROCESSING
    - NOT HERE YET
    - NOT SOLUTION TO ALL PROBLEMS
    - ORGANIZATIONAL AND TECHNOLOGICAL ISSUE

EDP ENVIRONMENT

SUMMARY

- MAINTENANCE, SOFTWARE AND SUPPORT MORE IMPORTANT THAN HARDWARE
  - INCREASING PEOPLE COSTS
  - DISTRIBUTION OF HARDWARE INCREASES PROBLEMS
- MANAGEMENT MORE DEMANDING OF EDP
  - EDP A COMPETITIVE FACTOR IN BUSINESS
  - MANAGERS FAMILIAR WITH EDP

EDP ENVIRONMENT

COMPUTERS INSTALLED IN U.S.

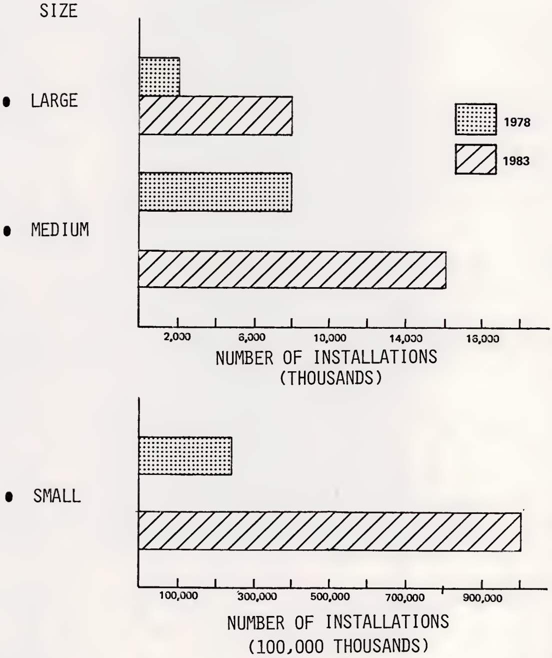
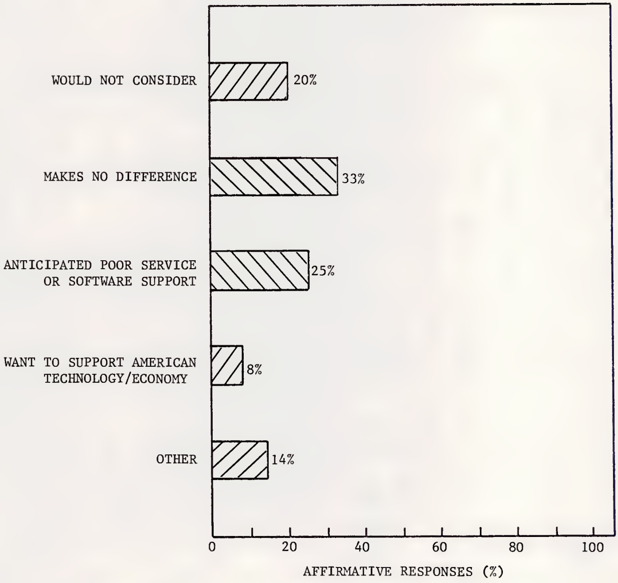


EXHIBIT III-19

ATTITUDE TOWARD FOREIGN MANUFACTURED MAINFRAME PRODUCTS



EDP ENVIRONMENT

SIGNIFICANT CHANGES IN EXPENDITURES

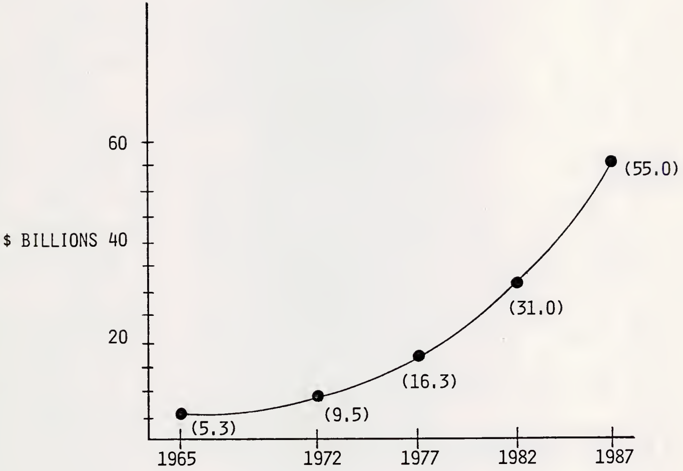
- MAIN COMPUTERS DECLINING SHARE
  - 28 PERCENT BUDGET - 1977
  - 25 PERCENT BUDGET - 1980
- PEOPLE DECLINING SHARE
  - 46 PERCENT BUDGET - 1977
  - 44 PERCENT BUDGET - 1980
- SMALL COMPUTERS/PROGRAMMABLE TERMINALS INCREASING FASTEST
  - 3 PERCENT BUDGET - 1977
  - 6 PERCENT BUDGET - 1980

3. IBM FUTURE

IBM AND FUTURE

PROJECTED REVENUES

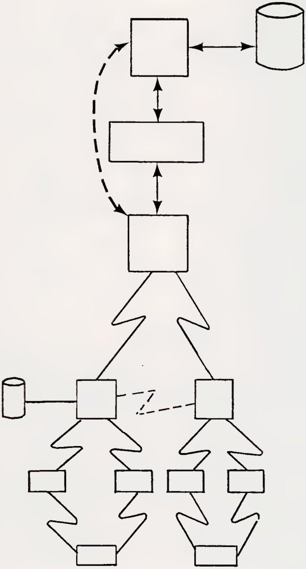
($ BILLIONS)



IBM CHALLENGES

- CONTAIN PCM THREAT
- DISTRIBUTED DATA PROCESSING WILL:
  - IMPACT INSTALLED BASE
  - IBM PARTICIPATION LAGS
- SYSTEM SOFTWARE
  - DESIGNED FOR BATCH ERA
  - WILL BE IMPORVED, NOT CHANGED
- MIGRATION TO WOW TECHNOLOGIES OF THE 1980S
- U. S. GOVERNMENT

IBM FUTURE
CURRENT & PROJECTED PRIORITIES

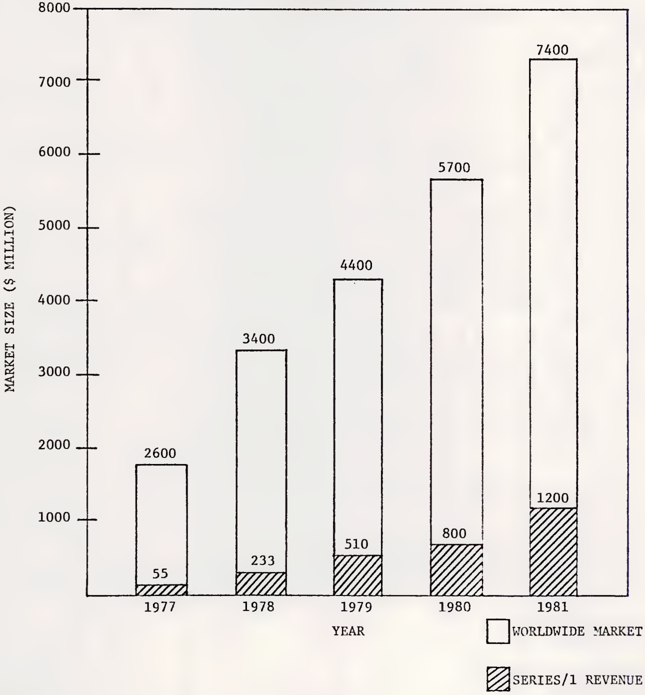


TECHNOLOGY	PRIORITY		
	CURRENT	1982	1987
SECONDARY STORAGE & MEMORY	④	④	②
PCM 370/30XX	①	⑦	⑥
MVS/IMS VTAM	③	②	⑦
370X 3790 MINIS TERMINALS	②	①	④
WORD & TEXT PROCESSING	⑤	③	①
REMOTE COMPUTING SERVICES	⑥	⑥	⑤
MICROS	⑦	⑤	③

EXHIBIT II-1

IBM SERIES/1 GROWTH IN THE

WORLDWIDE MINICOMPUTER MARKET



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IBM STRATEGIES

- PREPROCESSOR FOR DATA BASE LANGUAGES
- HARDWARE "SORT BOX" FOR HANDLING INDICES
- HARDWARE "ENCRYPTION BOX"
- INTELLIGENT MASS STORAGE SYSTEMS (?WHERE WILL THE PROCESSOR BE?)
- NEW COMMUNICATIONS FRONT END
- HARDWARE/FIRMWARE/SOFTWARE IS THE LINKING THREAD
- NEW PRODUCT LINE (VP) - 1981
- MAEP STRATEGY

EXHIBIT II-2

PROBABILITY MATRIX (BY YEAR) OF IBM LARGE SCALE SYSTEMS ANNOUNCEMENTS

ANNOUNCEMENT	1978	1979	1980	1981-83
NEW PRODUCT LINE	–	10%	40%	50%
3034 PROCESSOR	20%	10%	–	–
COMMUNICATIONS PROCESSOR	60%	40%	–	–
DISK SYSTEM (INTELLIGENT)	50%	50%	–	–
NEW MASS STORAGE	–	10%	30%	60%
DBMS PRE-PROCESSOR	40%	60%	–	–
DBMS HARDWARE ASSIST ("SORT BOX" &/OR ENCRYPTION)	60%	40%	–	–

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EXHIBIT II-4
PRICE-PERFORMANCE RATIOS
(158-3 PRIOR TO 3/77 = 1)

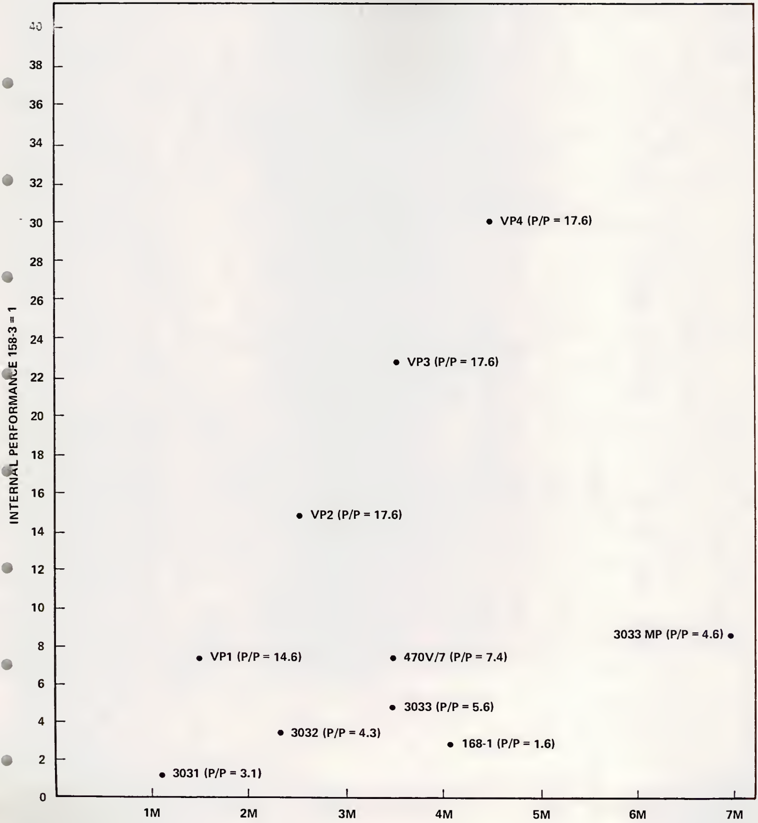

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EXHIBIT IV-2

ACTUAL AND PROJECTED VALUES FOR IBM 370/168 PROCESSOR

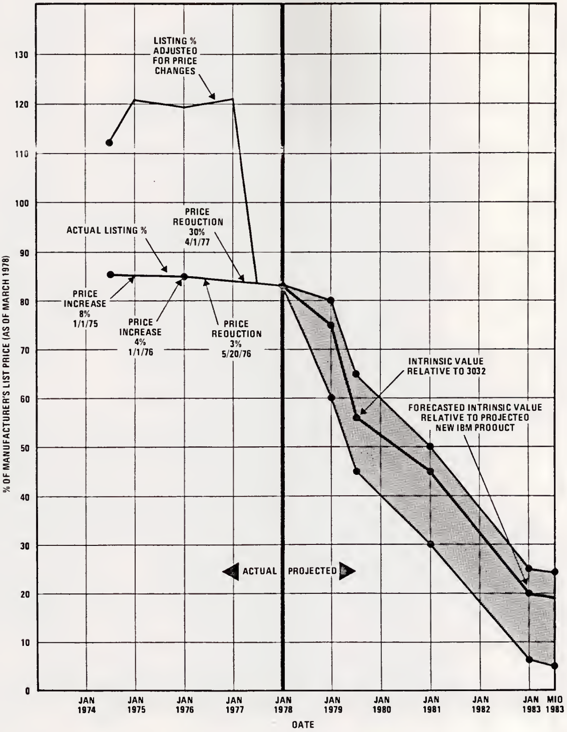

TABLE OF VALUES

PROJECTED VALUES RANGE	JAN 1979	JAN 1980	JAN 1981	JAN 1982	JAN 1983
HIGH	80%	60%	50%	38%	25%
EXPECTED	75%	53%	45%	32%	20%
LOW	60%	40%	30%	18%	8%

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4. DISTRIBUTED DATA PROCESSING

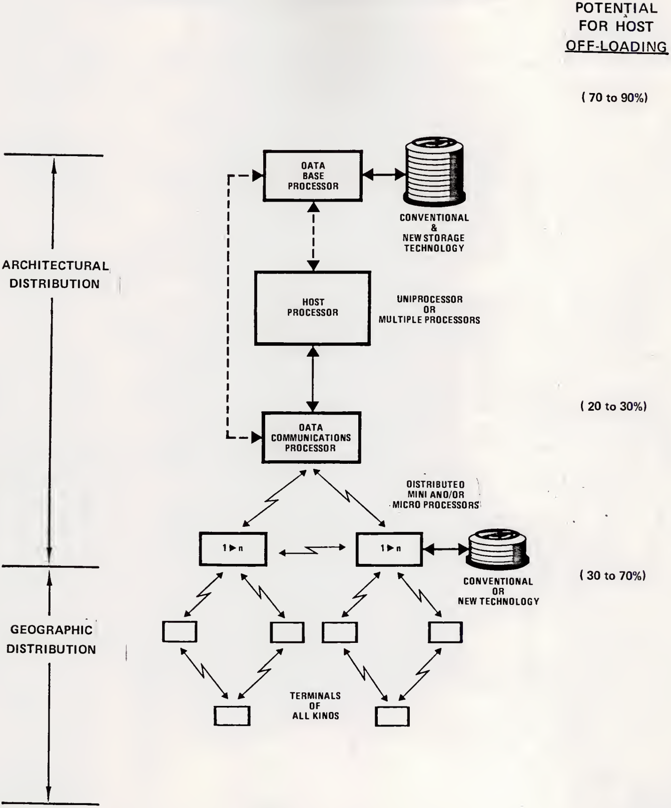
DISTRIBUTED DATA PROCESSING

OUTLOOK

- LIMITED ACCEPTANCE SO FAR
  - VERY LARGE COMPANIES
  - CERTAIN INDUSTRIES
- SOME EXCEPTIONS
  - DDP SERVICES TO SMALL COMPANIES
  - AGGRESSIVELY MANAGED MEDIUM-SIZED COMPANIES
- MAJOR DDP/MINICOMPUTER MARKETS
  - MANUFACTURING
  - RETAILING (CONTINGENT ON POS/EFTS)

EXHIBIT II-1

DISTRIBUTED DATA PROCESSING CONFIGURATION


POTENTIAL FOR HOST OFF-LOADING
(70 to 90%)
(20 to 30%)
(30 to 70%)
ARCHITECTURAL DISTRIBUTION
GEOGRAPHIC DISTRIBUTION
DATA BASE PROCESSOR
CONVENTIONAL & NEW STORAGE TECHNOLOGY
HOST PROCESSOR
UNIPROCESSOR OR MULTIPLE PROCESSORS
DATA COMMUNICATIONS PROCESSOR
DISTRIBUTED MINI AND/OR MICRO PROCESSORS
1 ▶ n
1 ▶ n
CONVENTIONAL OR NEW TECHNOLOGY
TERMINALS OF ALL KINDS

DISTRIBUTED DATA PROCESSING

MARKET FORECASTS

- MINICOMPUTERS IN DEDICATED DDP ENVIRONMENT
  - 10 PERCENT OF 1977 U. S. SHIPMENTS ($250 MILLION)
  - 40 PERCENT ANNUAL GROWTH TO 1983
  - $1.9 BILLION MARKET IN 1983
- MAIN COMPUTERS IN DDP ENVIRONMENT
  - 20 PERCENT OF 1977 U. S. SHIPMENTS
  - 50 PERCENT OF 1983 U. S. SHIPMENTS

DISTRIBUTED DATA PROCESSING

INHIBITING FORCES

- LACK OF USER COMMUNICATIONS EXPERTISE
- NO HARDWARE/SOFTWARE STANDARDS
- UNPROVEN DBMS PRODUCTS
- IGNORANCE OF THE CONCEPT BY SMALL USERS

DISTRIBUTED DATA PROCESSING

VENDOR QUALIFICATIONS

- EQUIPMENT RELIABILITY
- MAINTENANCE CAPABILITY
- SOFTWARE COMPATIBILITY
- HARDWARE COST/PERFORMANCE

5. SOFTWARE

SOFTWARE ISSUES

SYSTEMS SOFTWARE

- SOFTWARE IS THE CONTROL POINT NOT HARDWARE
- IBM'S HARDWARE/FIRMWARE/SOFTWARE (HFS) STRATEGY
  - PROTECTS HARDWARE
  - DISCOURAGES PLUG COMPATIBLES
  - RELATED TO SECURITY
  - ALREADY STARTED (MVS EXTENDED FUNCTION)

SOFTWARE ISSUES

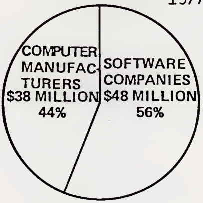
APPLICATIONS SOFTWARE

- DEMAND FOR APPLICATION SOFTWARE GREATER THAN EVER
  - COMPLEXITY INCREASING
  - LIMITS HARDWARE SALES
  - BASED ON OUTDATED LANGUAGES
  - NEW TOOLS AND TECHNIQUES (AUTOMATED APPLICATION DEVELOPMENT) ON THE WAY
- MAINTENANCE OF APPLICATIONS SOFTWARE INCREASING PROBLEM

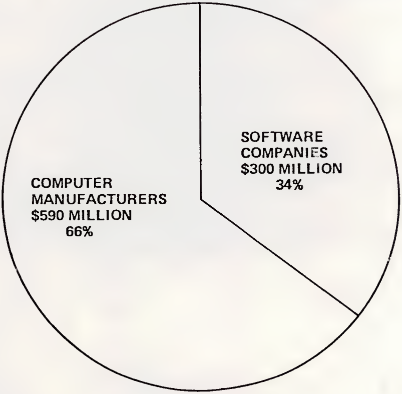
DATA BASE MANAGEMENT SYSTEMS

MARKET GROWTH

1977 $86 MILLION



1983 $890 MILLION



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INSTALLATIONS OF DBMS AND PENETRATION OF COMPUTER BASE, 1977 AND 1983

SIZE OF DBMS	1977		1983	
	NO. OF DBMS INSTALLATIONS	PENETRATION OF COMPUTERS AT THIS SIZE LEVEL	NO. OF DBMS INSTALLATIONS	PENETRATION OF COMPUTERS AT THIS SIZE LEVEL
LARGE	1,600	67%	7,000	90%
MEDIUM	2,700	45%	13,000	80%
SMALL	2,000	<1%	60,000	6%
VERY SMALL	–	0	90,000	8%*
TOTAL	6,300		170,000	

*OF MICRO BASED COMPUTER SYSTEMS

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ANTICIPATED GROWTH IN DBMS USAGE AMONG CURRENT DBMS USERS

PERCENTAGE OF TOTAL APPLICATIONS	
CURRENT DBMS USAGE	ANTICIPATED DBMS USAGE BY 1981
3%	40%
10	25
10	55
10	90
15	90
20	100
30	75
33	100
60	90

PROGRAMMER SKILL LEVEL REQUIRED FOR DBMS AS PERCEIVED BY RESPONDENTS

NAME OF DBMS	SKILL LEVEL		
	HIGH	MEDIUM	LOW
IDMS		●	
TOTAL		●	
ADABAS		●	
IMS	●		
SYSTEM 2000	●		
DATACOM/DB		●	
UNIVAC DMS		●	
MINI BASED DBMS			●

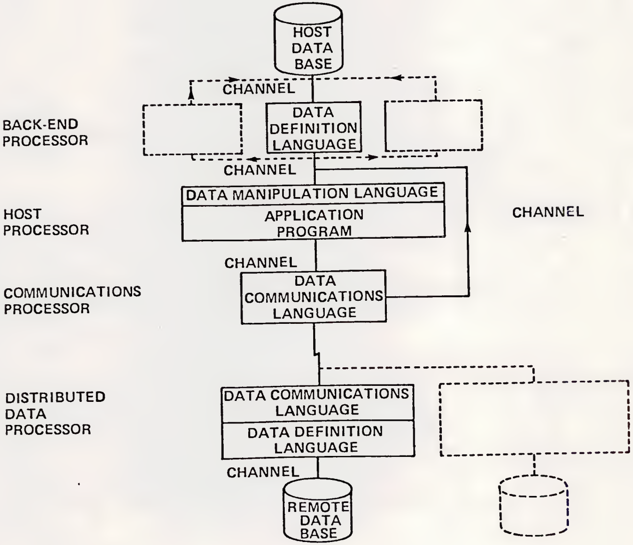
SKILL LEVELS:
HIGH = OVER 5 YEARS OF EXPERIENCE
MEDIUM = 2–5 YEARS OF EXPERIENCE
LOW = ENTRY LEVEL PROGRAMMER

IMPACT OF TECHNOLOGY

- DISTRIBUTED DATA BASES
  - COMPATIBILITY
  - CURRENT DBMS MUST BE UPGRADED OR REPLACED
- DATA BASE COMPUTERS
  - IMPROVED PRICE/PERFORMANCE (?)
  - DELAY UPGRADING MAINFRAMES
  - QUESTIONS OF MULTIPLE VENDORS RELIABILITY
  - 1983 MARKET BETWEEN \$200 MILLION AND \$300 MILLION

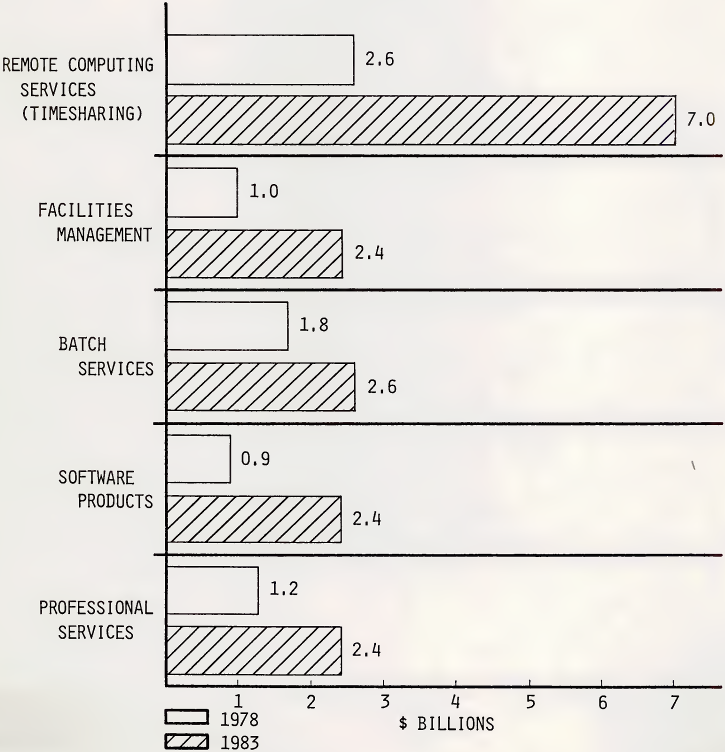
EXHIBIT III-14

DBMS ORGANIZATION IN A DISTRIBUTED AND BACK-END PROCESSING ENVIRONMENT



6. COMPUTER SERVICES

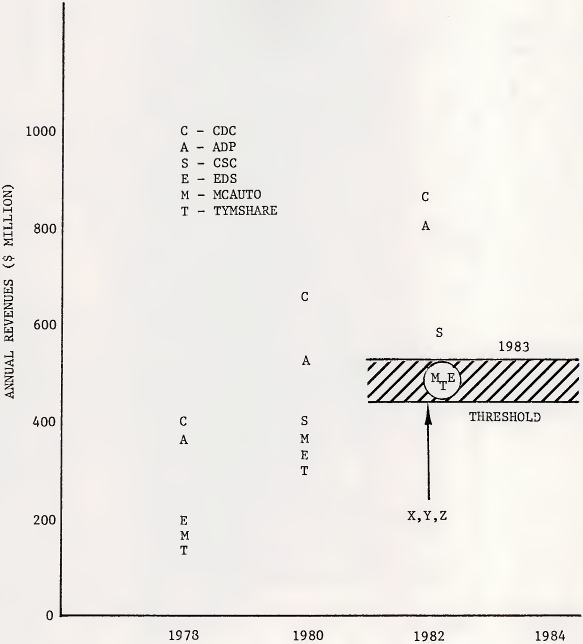
COMPUTER SERVICES
FORECASTED GROWTH IN U.S.



COMPUTER SERVICES
PROFITABILITY

PROFITABILITY / TYPE	SIZE IN ANNUAL REVENUES ($ MILLION)			WEIGHTED AVERAGE
	LESS THAN $2M	$2-10M	GREATER THAN $10M	
PROCESSING SERVICES	11.0%	9.9%	11.8%	11.3%
SOFTWARE PRODUCTS	11.2	19.9	8.5	14.3
PROFESSIONAL SERVICES	11.8	9.5	9.3	10.0
WEIGHTED AVERAGE	11.1%	11.2%	11.3%	11.3%

COMPUTER SERVICES LEADERS



EXHBIT IV-8

USER SELECTION FACTORS-RCS

SELECTION FACTOR	AVERAGE SCORE	PERCENT USER SELECTED AS MOST IMPORTANT
VENDOR'S KNOWLEDGE OF APPLICATION	4.2	53%
VENDOR'S REPUTATION	3.3	26%
CUSTOMER SUPPORT	3.2	13%
VENDOR'S KNOWLEDGE OF INDUSTRY	2.2	0%
PRICE	1.9	3% (ONE USER)
CONTRACT TERMS	.6	0%
RESPONSE TIME	.5	0%
RANGE OF SERVICES	.5	0%

(5= HIGH, 0 = LOW)

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EXHIBIT IV-9

USER SELECTION FACTORS-SOFTWARE PRODUCTS

SELECTION FACTOR	AVERAGE SCORE	PERCENT USER SELECTED AS MOST IMPORTANT
VENDOR'S KNOWLEDGE OF APPLICATION	4.5	69%
VENDOR'S REPUTATION	3.8	19%
CUSTOMER SUPPORT	3.4	15%
VENDOR'S KNOWLEDGE OF INDUSTRY	2.4	4%
PRICE	2.1	0%
CONTRACT TERMS	0.8	0%
RESPONSE TIME	0.5	0%
RANGE OF SERVICES	0.7	0%

(5=HIGH, 0=LOW)

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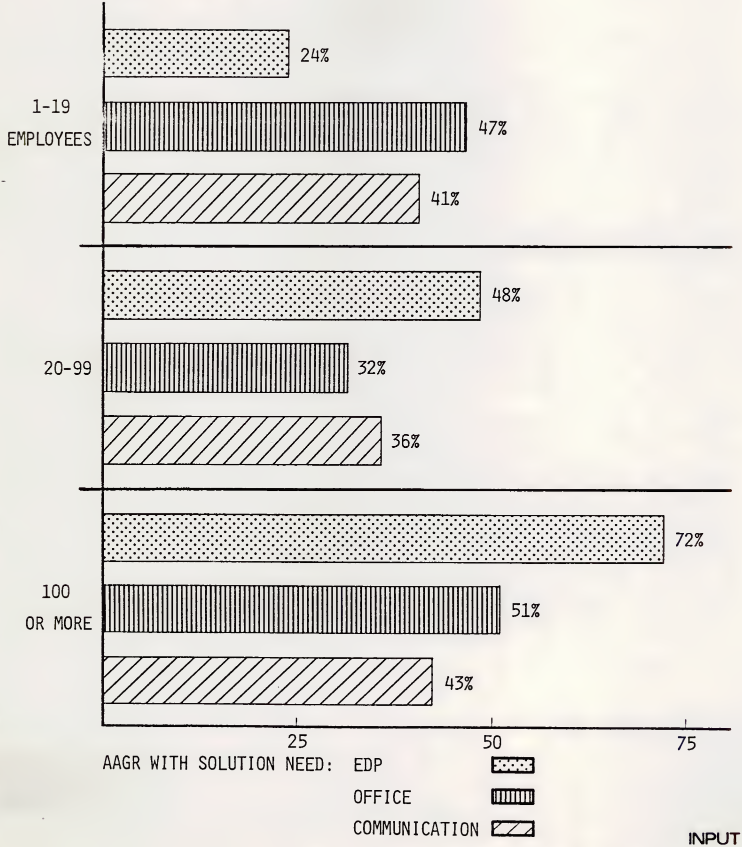
7. MULTI-FUNCTION EQUIPMENT

MULTI-FUNCTION EQUIPMENT

NEED BY COMPANY SIZE



MULTIFUNCTION EQUIPMENT

DESIRABLE FEATURES

- GENERAL
  - "AS MANY AS POSSIBLE"
  - "EXPANDABLE AS THE COMPANY GROWS"
- FUNCTIONAL
  - "FOR DATA ENTRY AND WORD PROCESSING"
  - "COMMUNICATING WORD PROCESSOR WITH PROFESSIONAL-LOOKING OUTPUT"
- APPLICATIONS RELATED
  - "PARTS EXPLOSION, INVENTORY CONTROL, ACCOUNTS PAYABLE AND RECEIVABLE, ORDER WRITING"
  - "MARKETING, CONTRACTS, ACCOUNTING"

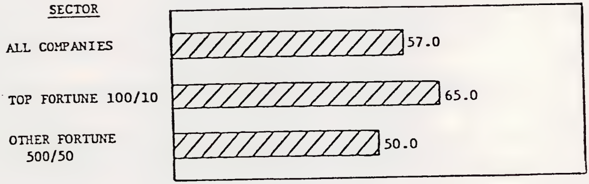
8. DISTRIBUTION CHANNELS

DISTRIBUTION CHANNELS

WAYS TO REACH THE PROSPECT

- MANUFACTURERS REPRESENTATIVES
- SYSTEMS HOUSES
- COMPUTER STORES WITH VENDOR NAME
- COMPUTER "HOBBY STORES"
- OFFICE EQUIPMENT DEALERS
- LARGE RETAILERS
- ELECTRONIC EQUIPMENT HOBBY STORES
- OFFICE AND COMPUTER SUPPLIES DEALERS
- COMPUTER SERVICE COMPANIES
- MAIL ORDER
- USER ASSOCIATIONS

RESPONDENTS' PLANS TO INTEGRATE OFFICE AUTOMATION INTO NETWORKS



DISTRIBUTION CHANNELS

VENDOR STORES

- A CONCEPT WHICH INTRIGUED THE USERS INTERVIEWED
- A PRECEDENT FROM AUTOMOBILE DEALERS - AVERAGE SIZE $3.5 MILLION
- POTENTIAL EFFICIENCY FOR VENDOR
  - NO TRAVEL
  - PROSPECTS "WALK IN"
  - SUPPORT IS LOCALIZED
- DIFFERENT VENDORS CAN SHARE: FOR EXAMPLE, OFFICE AND COMPUTER COMMUNICATIONS
- SHOWROOM IDEAL FOR DEMONSTRATIONS
- AT&T AND IBM BOTH EXPERIMENTING
  - IBM BUSINESS COMPUTER CENTER FOR 5100
  - AT&T TELEPHONE STORES
- FRANCHISING POSSIBLE
- ACCEPTED BY VENDORS AND USERS

CONCLUSION

- MORE CHANGE IN NEXT 5 YEARS THAN PREVIOUS 10
- DEMAND IS INCREASING FOR INFORMATION PRODUCTS AND SERVICES
- DISTINCTIONS BETWEEN VENDORS AND MARKETS DECREASING
- UNDERSTANDING THE USER IS THE KEY TO SUCCESS